REMARKS

This communication is in response to the Office Action mailed October 20, 2008. In the Office Action, the Examiner indicates that claims 2-8 are allowed, which Applicant appreciates. It is respectfully submitted that the present amendments put this application in condition for allowance (and, given the nature of the amendments, the amendments do not necessitate additional searching such that they cannot be entered after final rejection).

Anticipation Rejection of Claims 9 and 10

Turning now the rejections, claims 9 and 10 are rejected as being anticipated by Candy (US Patent No. 4,942,360 – referred to herein as '360 Candy). Claim 9 (a method claim) has been amended to incorporate the features of allowed claims 2 and 3, with no new matter being added by way of this amendment. Thus, claim 9 is allowable for at least the reasons claims 2 and 3 have been allowed. Given the allowance of claims 2 and 3, the Examiner can easily make the determination of allowability of claim 9 with no additional searching. Claim 10, dependent on amended claim 9, is allowable for at least the reasons that claim 9 is allowable.

Obviousness Rejection of Claims 1 and 11

Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over '360 Candy in view of Candy (US Patent No. 5,576,624) referred to herein as '624 Candy but which was referred to in the Office Action as Candy II.

First, it is important to note that the subject matter of claim 1 and 11, and hence the following description, relates primarily to time domain transmit characteristics applied to the transmit coil, while signals received by the receive coil and subsequent signal processing may be treated and analyzed in either the frequency or time domain, and examples are mostly in the time domain. All the embodiments used in the subject patent specification describe time domain transmission (i.e. nil to use of sinewaves).

The term "reactive transmit coil voltages does not change significantly" is mentioned in the '360 Candy patent at Col 8 lines 4-5, but this refers to this condition being met while using, for the transmit waveform, constantly changing sinewaves (not "DC" non-varying signals). Those sinewaves do have constant RMS voltages. The '360 Candy patent uses (conventional) indirect slow feedback loops (not real time) which measure the in-phase and quadrature current and then uses those measurements to adjust the applied (frequency domain) sinewave at voltages which produce constant reactive voltage sinewaves, that is, with no periods of actual constant reactive voltage.

Whereas, with applicant's invention as recited in claim 1, the term "reactive transmit voltages" being "approximately constant" refers to a non-changing/constant direct current voltage.

The significance of this interpretation becomes more clear when it is realized that the cited '360 Candy patent discloses a "frequency domain" application, whereas the applicant's claim 1 is directed to a "time domain" application in which only "reactive transmit voltages" being "approximately constant" is possible.

In particular, by way of explanation, producing constant reactive RMS voltage sinewaves in an inductor in the frequency domain is simply achieved and disclosed in the '360 Candy patent. To the contrary, as described in the present patent application, in the time domain, producing a constant reactive voltage in an inductor is non-trivial and thus the applicant has provided a novel and non-obvious approach.

Several time domain embodiments are disclosed in the applicant's specification -- for example, using a linear element with a negative output impedance approximately equal to the equivalent series resistance of the transmit inductance. The input applied voltage to the output stage is thus approximately equal to the intended reactive voltage because the transfer function is approximately independent of the series transmit coil resistance. Hence the applied voltage is an approximate rectangular-wave plus a compensating triangular-wave voltage, which ramps to track the triangular-wave transmit coil current flowing in transmit coil series resistance. The result is a rectangular-wave reactive transmit voltage with periods of literally constant voltage (literally unchanging in time, unlike sinewaves which continually change in time.)

The approach and execution disclosed in the applicant's patent application and recited in claims 1 and 11 is certainly not taught or even suggested in '360 Candy patent primarily because the '360 Candy patent discloses using "simultaneous magnetic interrogation signals transmitted at different frequencies," which is clearly a frequency domain approach.

Furthermore, the '360 Candy patent does not disclose generation of a transmit signal which is clearly defined as (rectangular) in the time domain (in claim 2) with periods of literally constant reactive voltage, and wherein a ratio of reactive transmit voltages at each of the at least two frequencies is substantially constant for a selected range of transmit coil effective inductive component impedance.

Thus, particularly in view of the timing control circuit element added to claim 1, which is argued by the examiner to have been disclosed in ' 624 Candy, claim 1 continues to be novel and inventive over and above '360 Candy and '624 Candy individually or in combination.

Therefore, withdrawal of the rejection of Claim 1 is respectively requested.

Claim 11 recites employing the metal detector recited in claim 1 and, thus, is allowable for at least similar reasons that claim 1 is allowable.

For at least the reasons set forth above, withdrawal of the obviousness rejection is respectively requested.

CONCLUSION

It is respectfully submitted that this reply is fully responsive to all outstanding issues and places this application in condition for allowance without requirement for further search. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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